Stormwater, Sewage and TMDLS

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Water Quality Agencies

- Federal – USEPA. We are in Region IX.
- State – State Water Resources Control Board – water quality – surface and groundwater. Also, water rights.
- 9 Regional Water Quality Control Boards – we are in Region 4 – just water quality
- Drinking water quality – State Department of Public Health and USEPA – Safe Drinking Water Act – What comes out of the tap.

State CWA Authority

- Most States implement this CWA under U.S. EPA authority, which can be rescinded where state fails to meet federal requirements [40 C.F.R. §§ 123.63-123.64]
- Anomaly: California Regional Water Board System [SB 1001 (2007)]

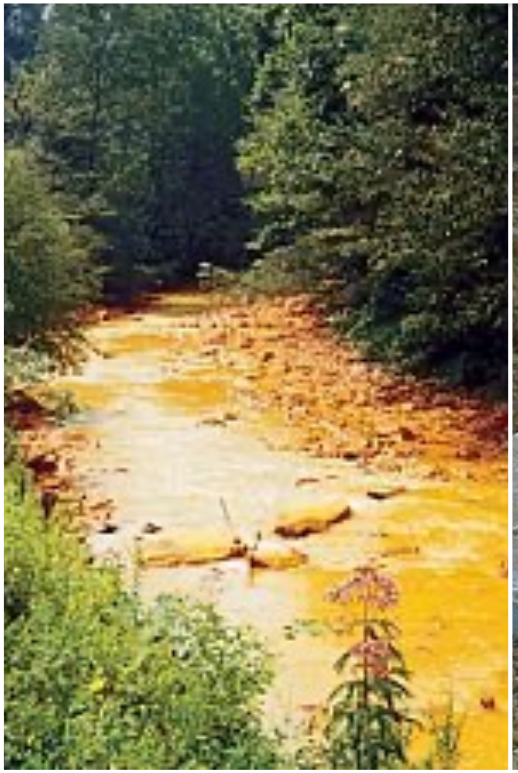
California's Nine Regional Water Quality Control Boards

The Clean Water Act

- Pollution Sources – Point Sources and Non-Point Sources
- Point sources – sewage, industry, stormwater
- NPS – septics, mining, forestry, marinas, agriculture
- Also, regulates thermal discharges from power plants. Impacts of power plants on aquatic resources
- Dredging and filling of waters of the United States – critical wetland and riparian protection decisions
- Disposal of dredged materials in receiving waters.
- Research – Toxicity, health risks, analytical chemistry, etc.

Point Sources

Non-Point Sources



Clean Water Act

- **Success – Point sources –**
  - Money for Funding – grants and loans
  - Numeric effluent limits in permits, NTR
  - 3rd party right to enforce
  - Monitoring – effluent, receiving waters, toxics, toxicity
  - Industrial Waste Programs

Failure – Stormwater and NPS

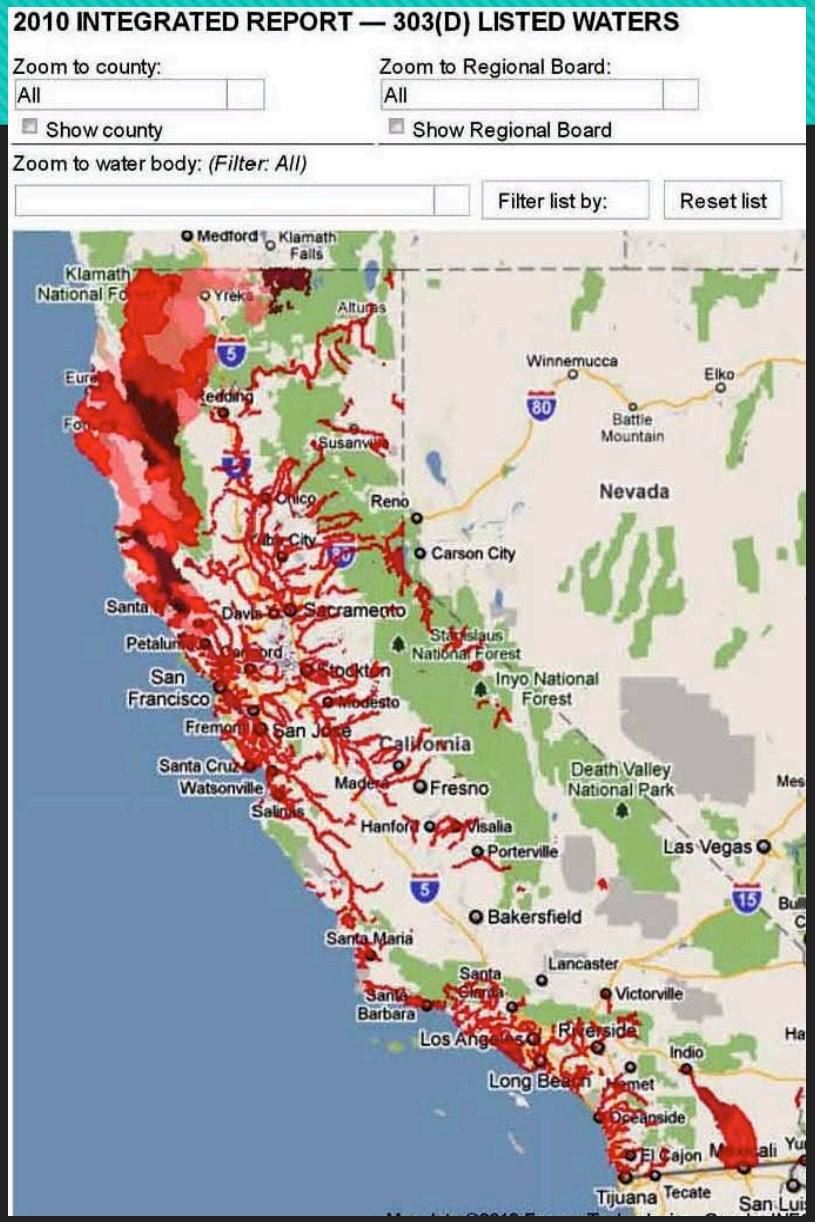
- no money
- No numeric limits – BMP to the MEP
- For all sources – 126 priority pollutants

Water Quality Standards: Designated Uses

Photo by Linda Sheehan

- All existing and potential uses of a waterway identified (fishing, habitat, swimming, drinking, protected area, recreation, irrigation, etc.)
- Protect "Existing Uses" - those attained on or after Nov. 28, 1975
- Rebuttable presumption that all water bodies should be "fishable and swimmable" [Sec. 101(a)(2)]
- State can prepare a Use Attainability Analysis if it believes these uses are not feasible (e.g. natural pollutants)

Monitoring Reports

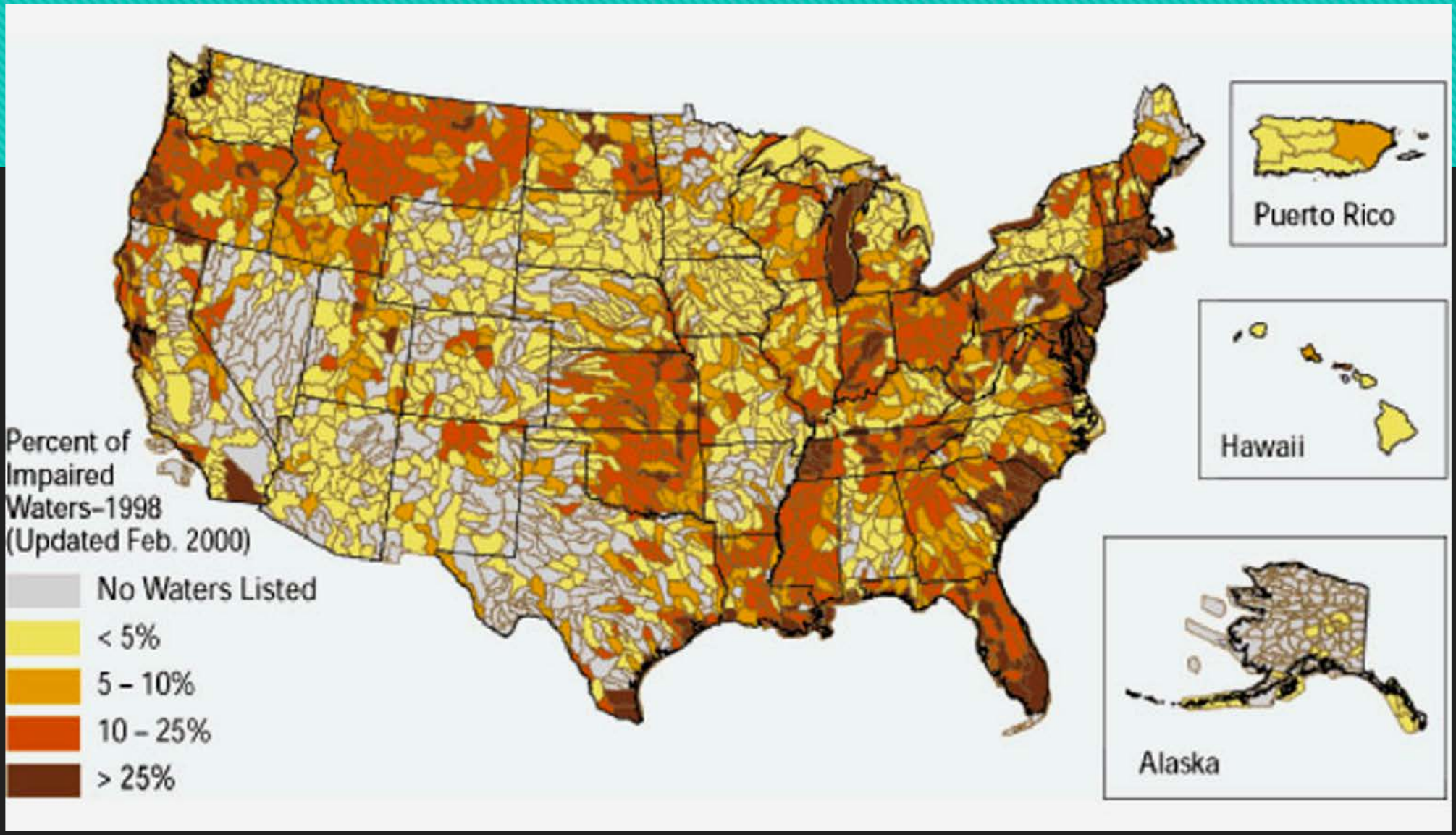


- Every two years each state must report on the health of all its waters one Integrated Report
- CWA Sec.305(b): describe quality of all navigable waters and extent to which they meet standards
- CWA Sec. 303(d): identify all impaired and threatened waters

Clean Water Act

- Water Quality Assessment – periodic assessments required.
- Impaired Waters
  - Beneficial uses – aquatic life, water supply, recreation, industrial, etc.
  - Impairment – loss of beneficial use
  - 303d list of impaired waters
  - Listing and delisting

Pollution Issues



Other CWA Elements

- Section 404 – Dredge and Fill of waters of the U.S.
- Section 401 certification – State certification of compliance with S. 404
- Also – the Marine Protection, Research and Sanctuaries Act (Ocean Dumping Act – ocean disposal)

- S. 316b – Operation of coastal power plants
- S. 301 – sewage treatment plant requirements

National Pollutant Discharge Elimination System permits

- Include – effluent limits based on water quality standards (concentration based) – both numeric and narrative. Some even have technological standards like for sewage treatment plants and power plants.
- Monitoring requirements – effluent and receiving waters
- Enforcement provisions. Also, spill response requirements

Porter Cologne Act

- Basin Plans – beneficial uses, water quality objectives, strategic planning and implementation, plans and policies, monitoring and assessment
- Ocean Plan – water quality objectives
- Inland Waters Plan
- Enclosed Bays and Estuaries Plan
- State Implementation Plan – reasonable potential analysis, dilution factors
- Waste Discharge Requirements for NPS –
- Groundwater quality

What causes ocean pollution?
Sewers and Storm Drains

In Southern California, sewers and storm drains are two completely separate systems.

Polluted Water in Los Angeles

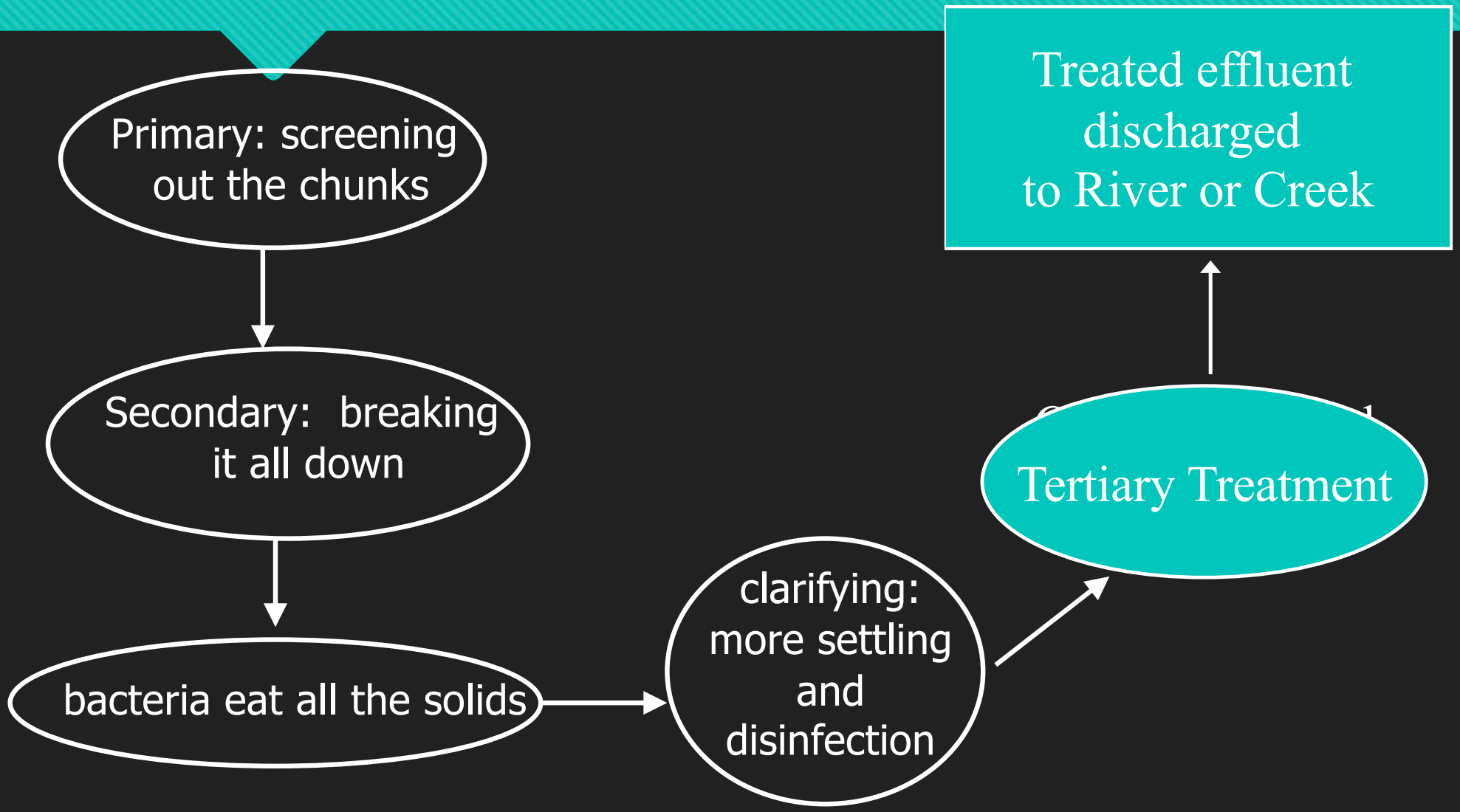
- Water quality has been protected since 1972
  - Clean Water Act
  - Porter Cologne Act
  - Goal: Swimmable, Fishable
  - Success: big, traditional polluters
- 160 polluted waterbodies in Los Angeles County

Point Sources

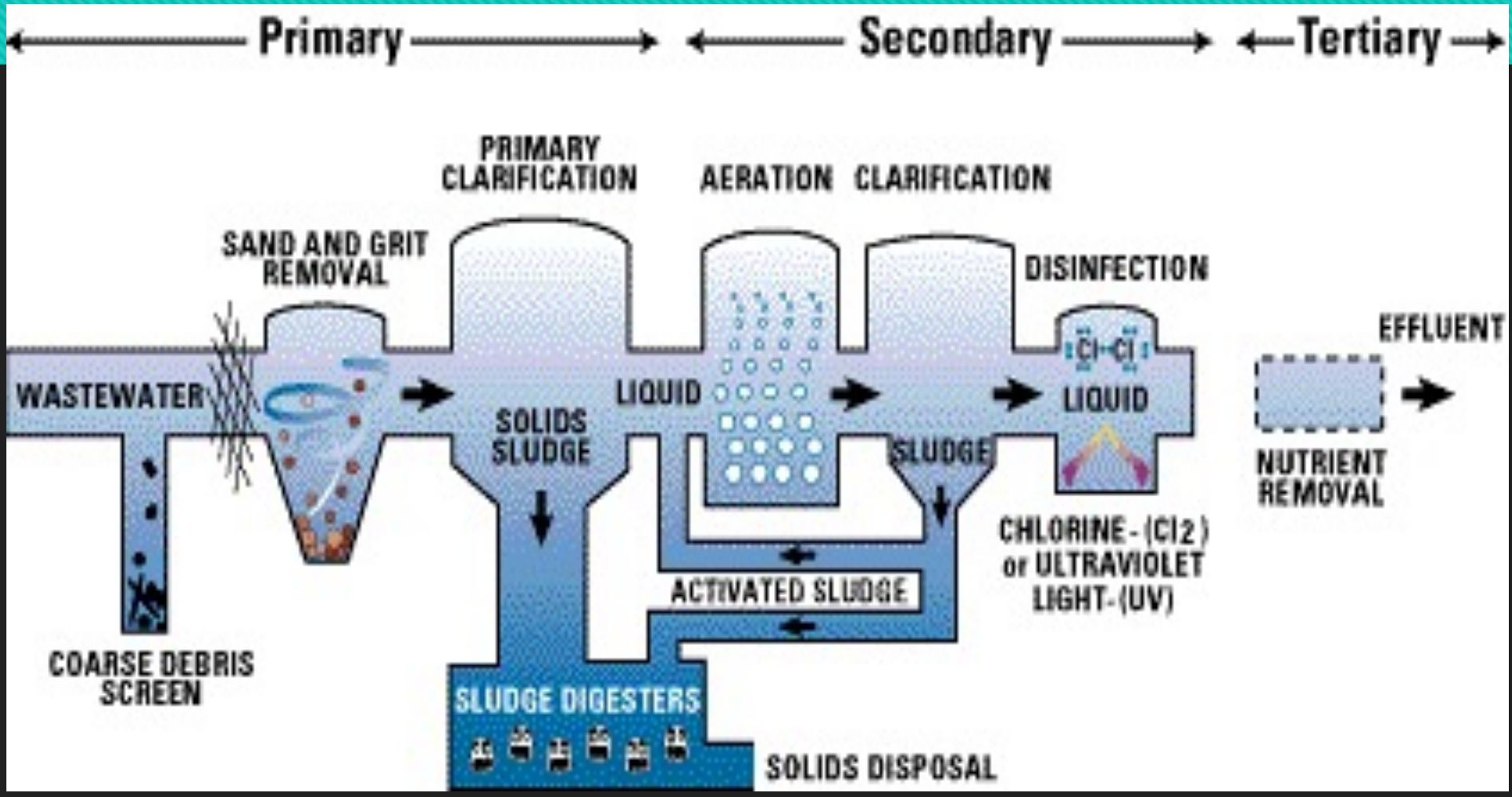
Hyperion Treatment Plant

LACSD Joint Water Pollution Control Plant

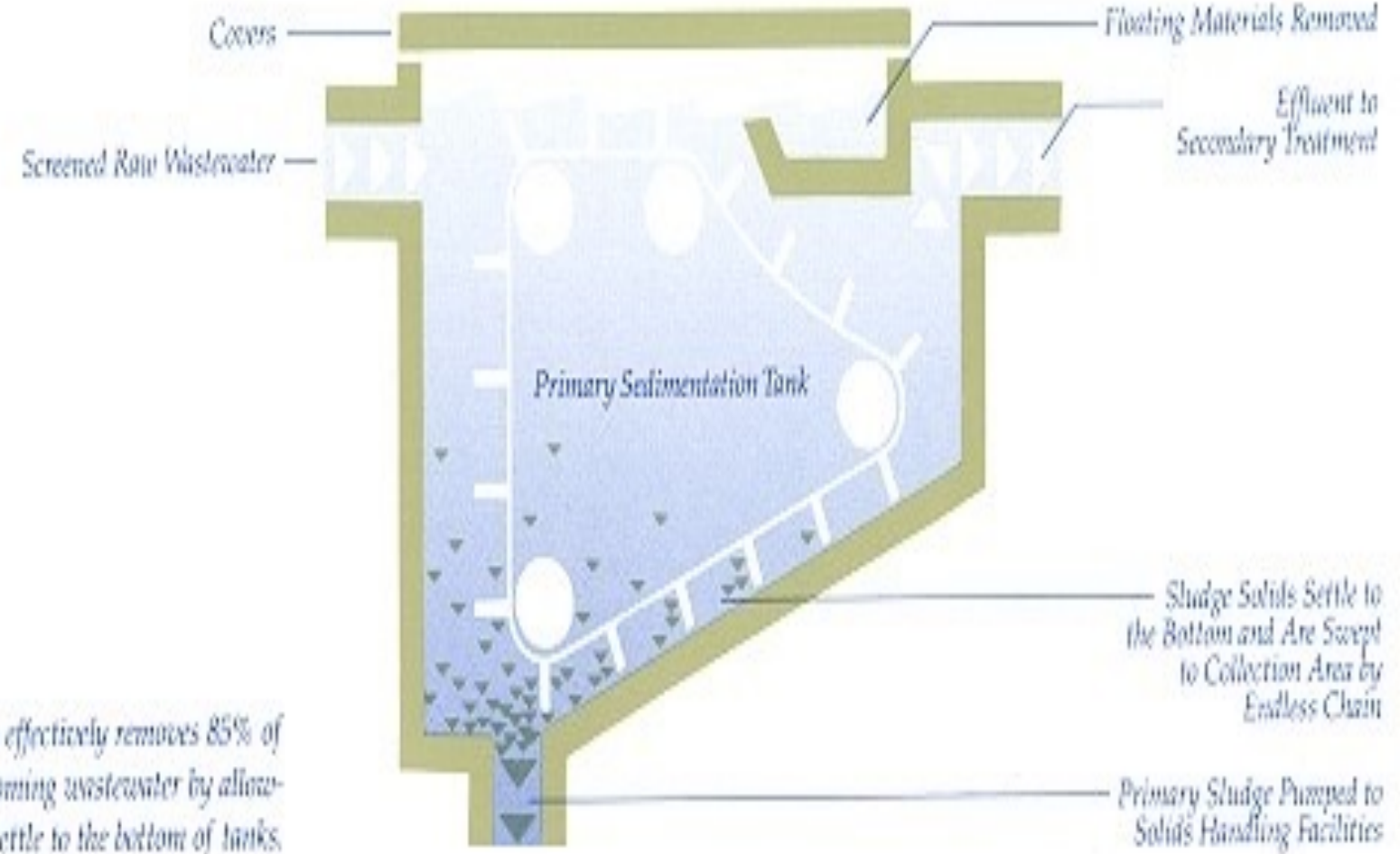
Primary & Secondary Treatment


Primary: screening out the chunks
Secondary: breaking it all down
bacteria eat all the solids
clarifying: more settling and disinfection
Tertiary Treatment
Treated effluent discharged to River or Creek

Wastewater Schematic

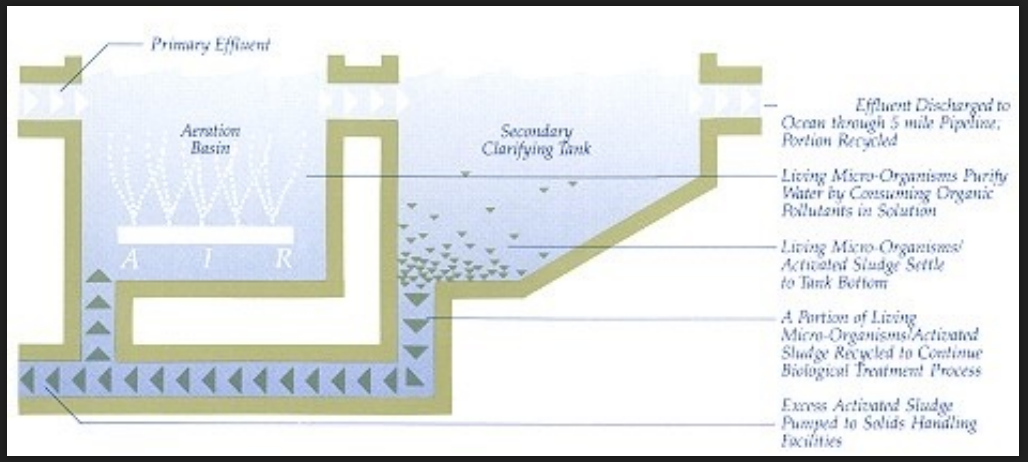


Primary Treatment


Covers
Floating Materials Removed
Effluent to Secondary Treatment
Screened Raw Wastewater
Primary Sedimentation Tank
Sludge Solids Settle to the Bottom and Are Swept to Collection Area by Endless Chain
Primary Sludge Pumped to Solids Handling Facilities

Primary treatment effectively removes 85% of the solids from incoming wastewater by allowing particles to settle to the bottom of tanks.

Secondary Treatment


Primary Effluent
Aeration Basin
Secondary Clarifying Tank
A I R
Effluent Discharged to Ocean through 5 mile Pipeline; Portion Recycled
Living Micro-Organisms Purify Water by Consuming Organic Pollutants in Solution
Living Micro-Organisms/ Activated Sludge Settle to Tank Bottom
A Portion of Living Micro-Organisms/Activated Sludge Recycled to Continue Biological Treatment Process
Excess Activated Sludge Pumped to Solids Handling Facilities

Aeration Basin II

Pollutants Removed

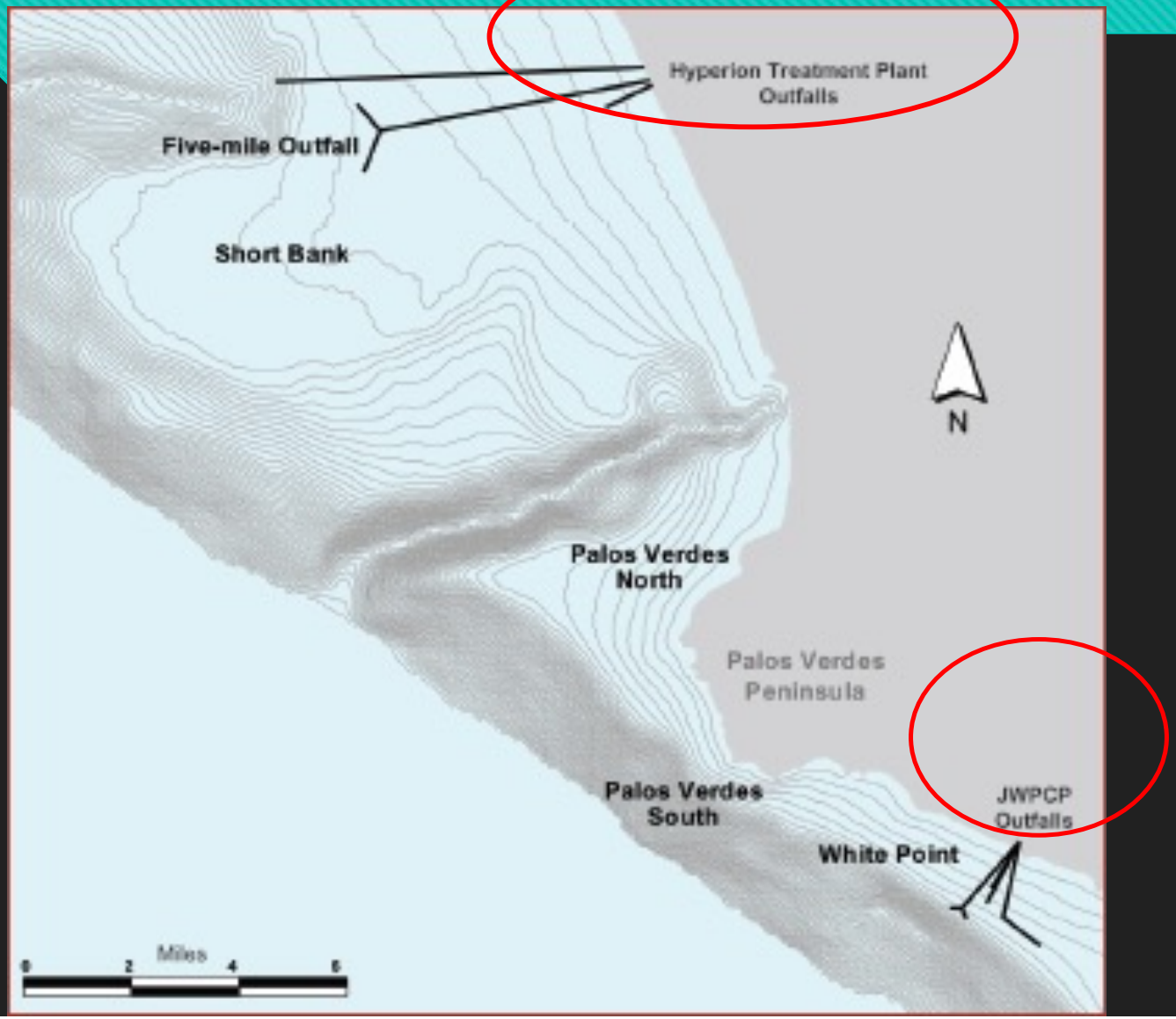
Major

Dissolved Nutrients & Organic material---- through an aerobic process.

Minor

Pathogens

Treatment at Hyperion & Carson:



Hyperion Sewage Spill – July 11th-12th

17 million gallon spill

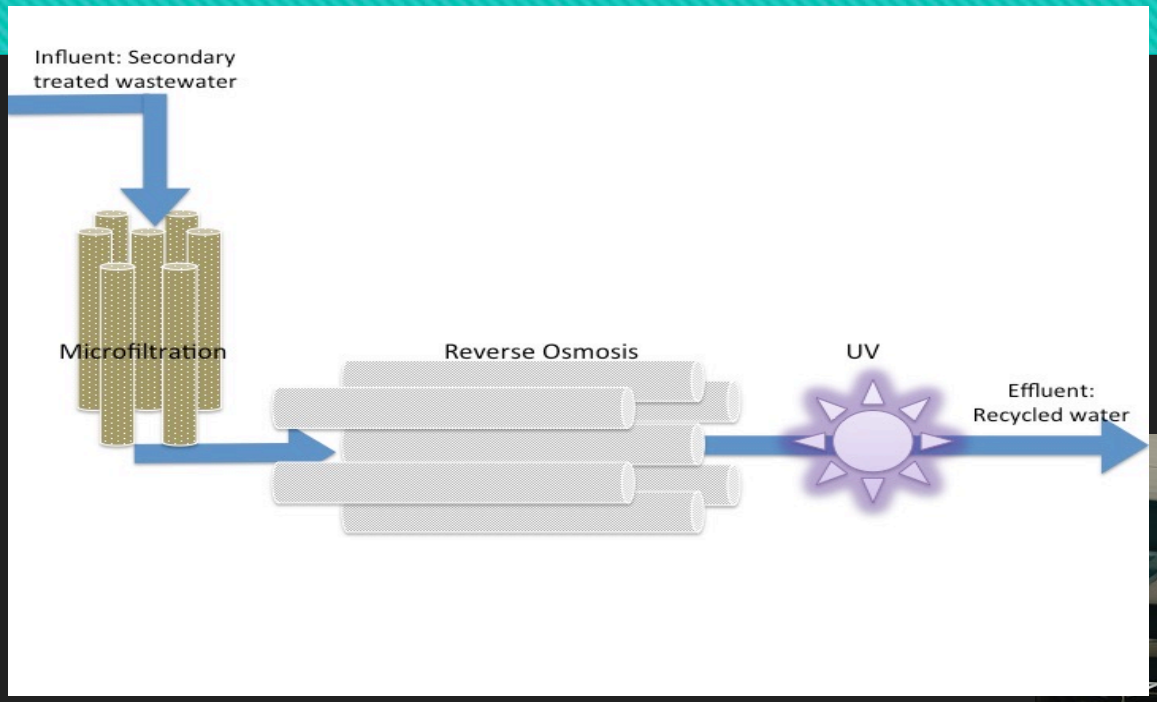
What happened?

Water Recycling

- Tertiary Treatment (filtration and disinfection – Title 22 – bacteria 2.2 total coliforms cfu per 100 ml and turbidity not to exceed 10 NTU (nephlometric turbidity units))
- Advanced treatment – MF-RO, denitrification, UV-peroxide – NDMA removal
- Non-potable uses – irrigation and industry
- Indirect Potable Reuse – mixing – groundwater or reservoirs – purple pipe
- Direct Potable Reuse – no infrastructure

West Basin – Ed Little Water Recycling Plant

Advanced Treatment



301h Waiver

- CWA requires sewage treatment plants to meet technology based 30-30 standard
- 1977 CWA amendment – 301h added.
- 5 year waiver granted by USEPA
- Discharger must demonstrate that effluent complies with water quality standards (other than 30-30 standard.
- There must be a balanced indigenous population of marine organisms outside the zone of initial dilution.

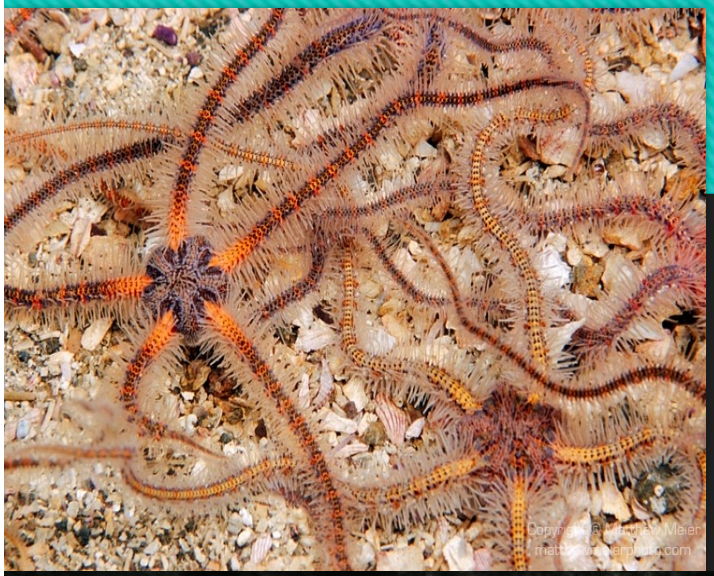
Sewage in Santa Monica Bay

- Hyperion Treatment Plant – dead zone
- Consent Decree in 1986.
- Sludge out of bay in 1987
- Full Secondary in 1998
- Over 90% reduction in sewage solids
- Cost - $1.6 Billion for Hyperion. Another $2.5 Billion for sewer infrastructure
- Benthic community near outfall is nearly identical to reference locations

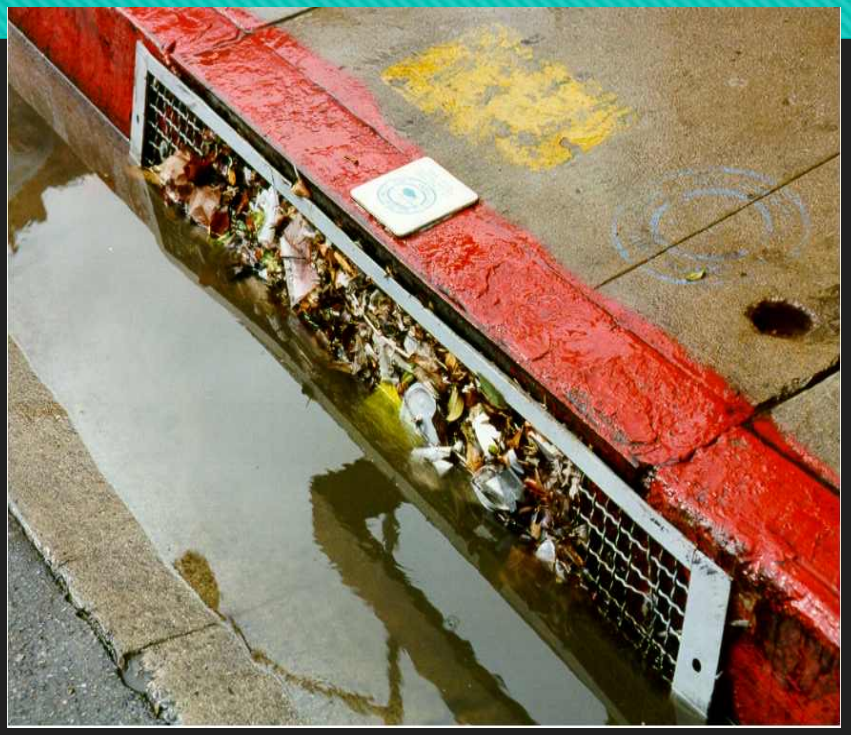
LACSD Joint Water Pollution Control Plant

- Palos Verdes shelf – lack of echinoderms. Prevalence of polychaetes
- 301h waiver – novel argument. High TSS needed to bury DDT-PCB contaminated sediment
- Consent Decree in 1997
- Full secondary in 2002
- Cost - $400 million

BIP outside the ZID



Regulated as Point Sources After 1987 CWA Amendment



Urban Runoff-Impacted Beach
Dockweiler Beach, CA

Santa Monica Pier

Municipal Stormwater Permit Requirements

- Implement Best Management Practices to the Maximum Extent Practicable
- No discharges of dry weather runoff (some exceptions)
- Discharge cannot cause or contribute to exceedances of water quality standards
- Comprehensive stormwater management plan

The Evolution of Los Angeles Region's Stormwater Permits

- 1996 - Los Angeles County permit – Requirement to add stormwater elements to General Plan
- 2001 - Standard Urban Stormwater Mitigation Plan (SUSMP) requirements – capture, treat or infiltrate 100% of the runoff generated from the 85th percentile storm

2009 - Ventura MS4 Issues

- Monitoring – ecological impacts
- Low Impact Development requirements (replicating the pre-development hydrologic regime through the use of design techniques to infiltrate, store and evapotranspire runoff)
- Defining MEP for BMPs – at least median performance as a design standard. Perhaps 75th percentile or more for BMPs adjacent to impaired waters.
- Hydromodification requirements – mimic predevelopment conditions

Municipal Permit (cont.)

- Monitoring – compliance and receiving water – end of pipe.

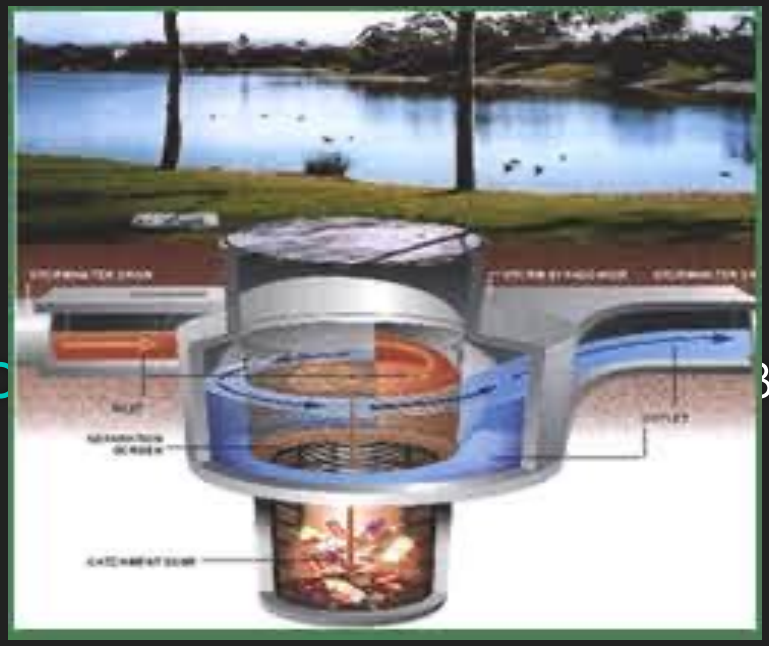
  -- rivers, nearshore waters, beaches
- TMDL requirements – Waste Load allocations, implementation milestones, numeric effluent limits
- MS4 maintenance – street sweeping, catch basin cleaning, etc.

LA County 2012 Permit

- Watershed Management Plans
- Enhanced Watershed Management Plans
- Reasonable Assurance Analysis
- Monitoring
- LID

- **Problems** – Lack of Funding. Lack of compliance deadlines other than TMDLs. Safe harbor?
- 37 entities appealed the permit

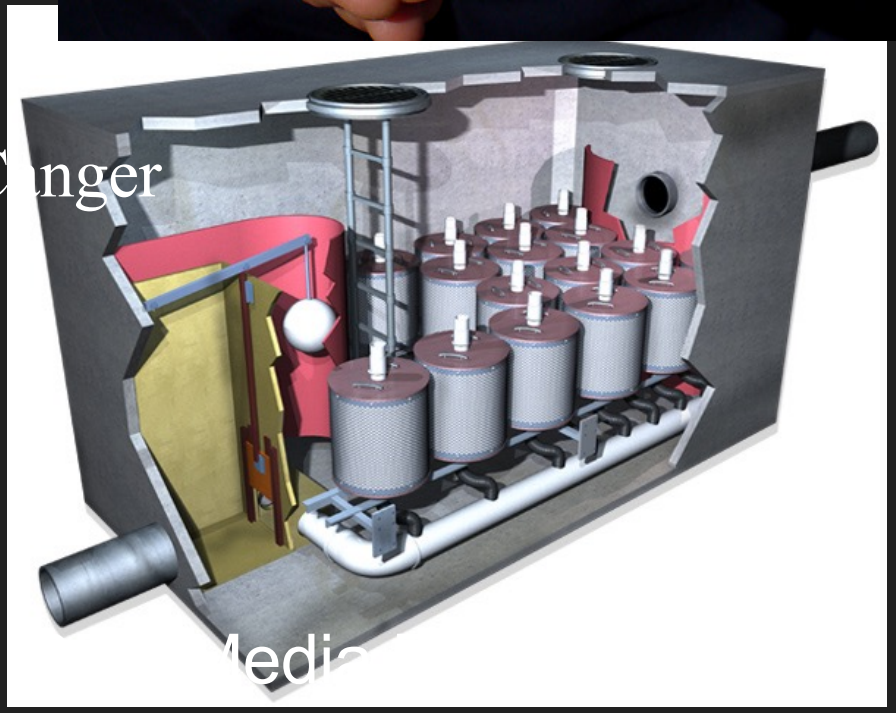
Structural BMPs



- C Basin screens + inserts

Filters

StormFilter
TM



System Source: CDS Technologies, Inc.

Site Design/LID Concepts

Some Common LID Best Management Practices [5]

Vegetated Swales / Bioswales	Rain Gardens	Rain Cisterns	Green Roofs
Permeable Pavers	Porous Pavement	Curb Bump-Outs	Curb Cuts

Vegetative Buffers

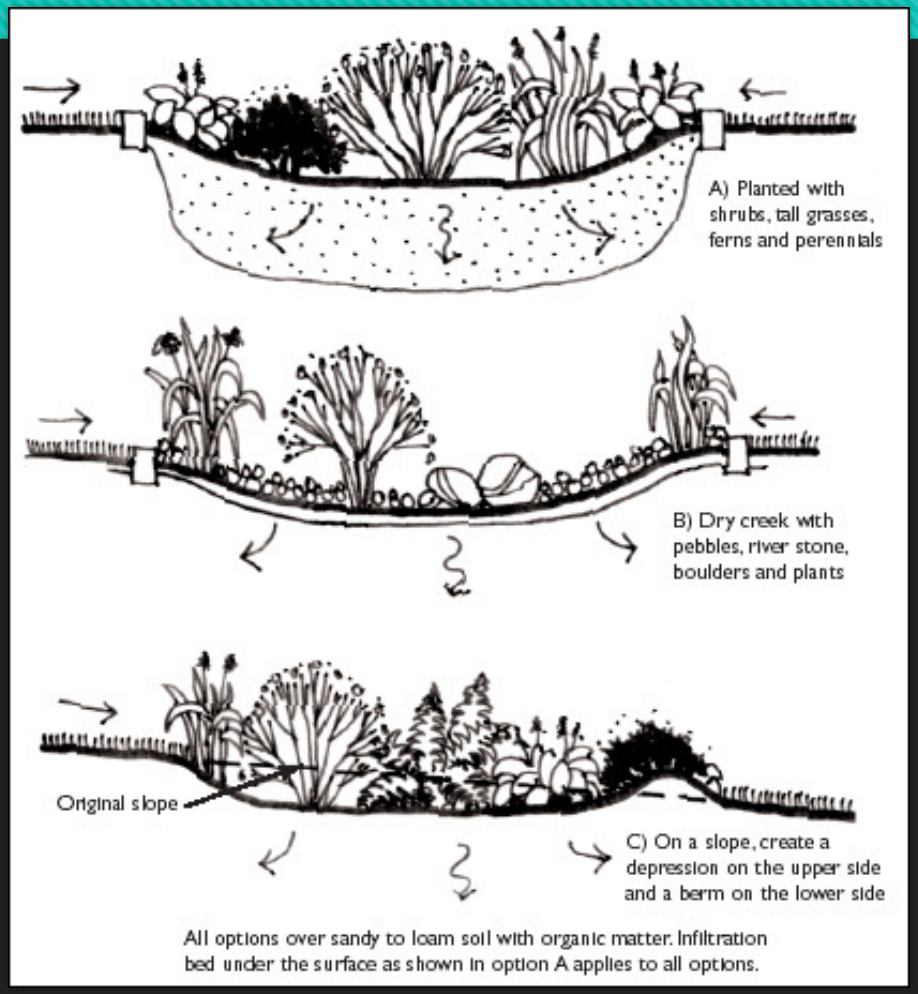
Bad

Good

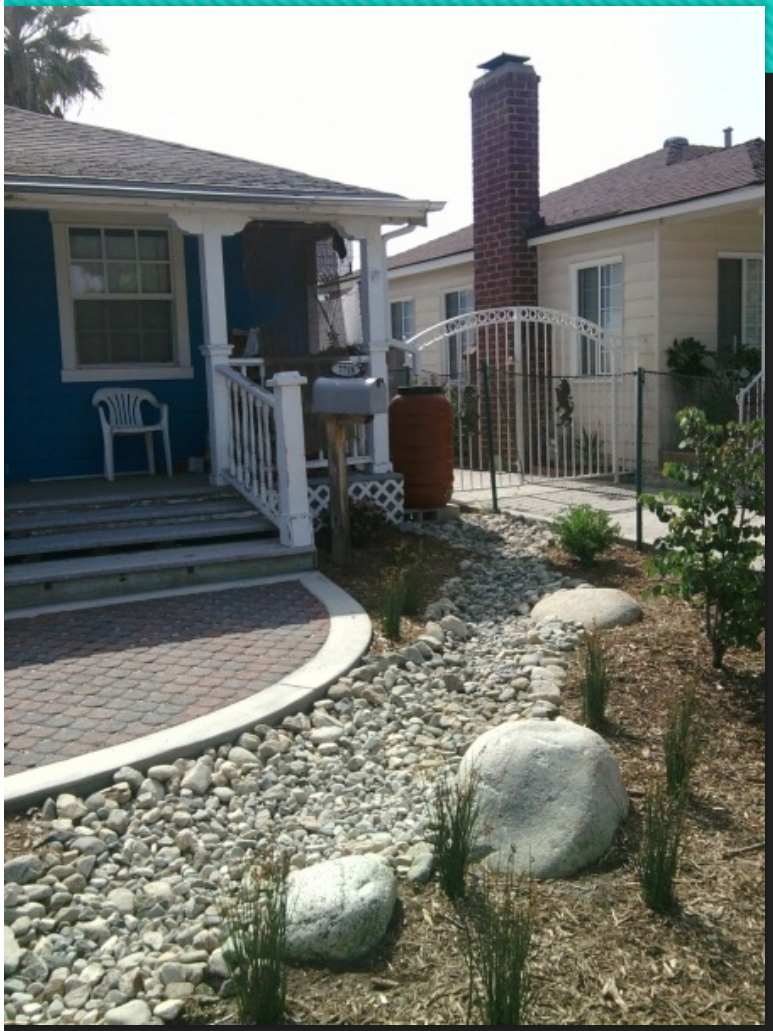
Wet Pond

Los Angeles Ultra Urban Biofiltration

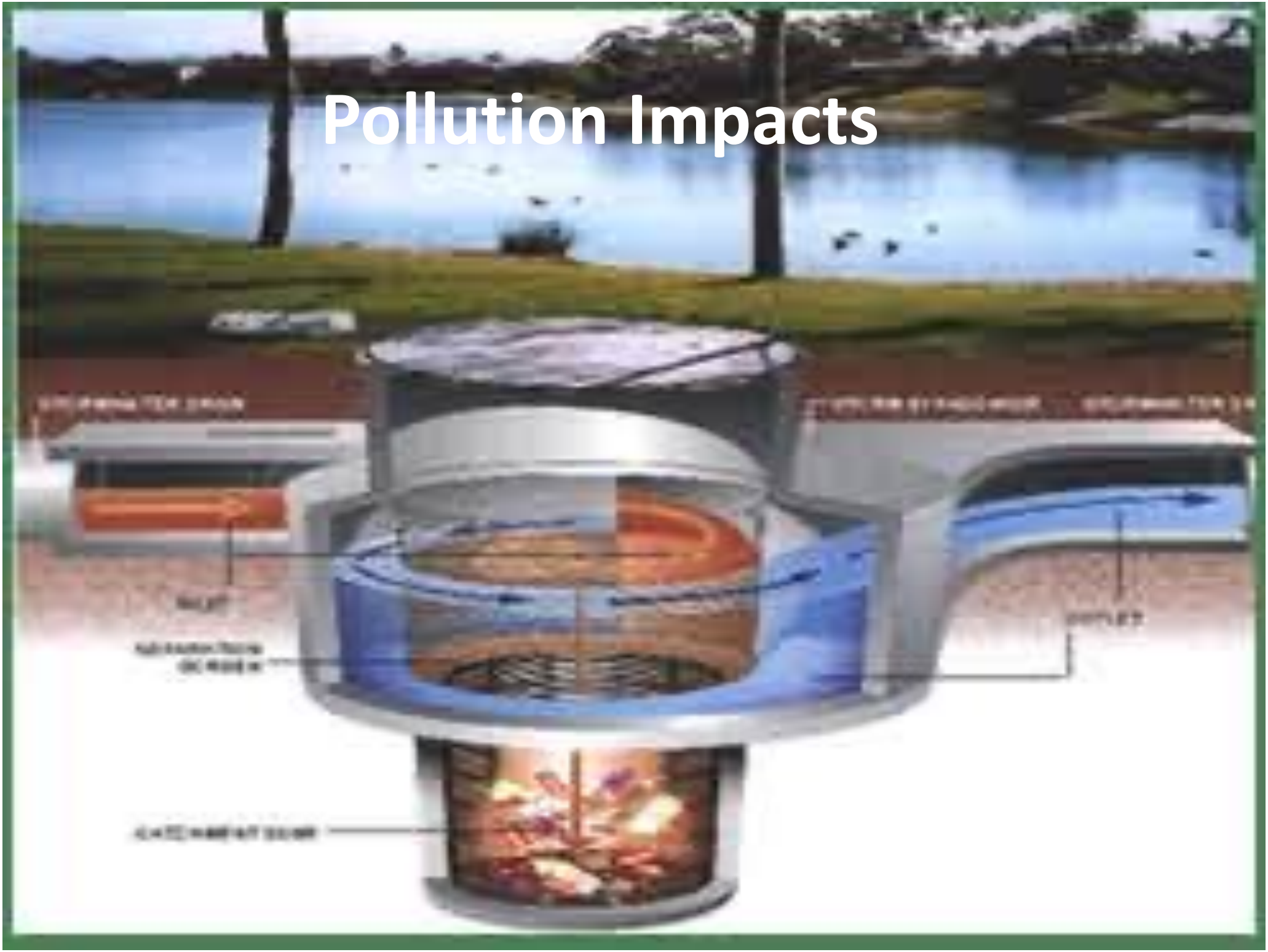
Rain gardens


A) Planted with shrubs, tall grasses, ferns and perennials
B) Dry creek with pebbles, river stone, boulders and plants
Original slope
C) On a slope, create a depression on the upper side and a berm on the lower side
All options over sandy to loam soil with organic matter. Infiltration bed under the surface as shown in option A applies to all options.

Elmer Avenue



Pollution Impacts



LA River/Ballona Creek Trash Total Maximum Daily Load

1. WLA of zero trash
2. Compliance - MEP – install full capture devices throughout the stormdrain system
3. Full capture device defined as a device that captures 100% of the particles retained by a 5 mm mesh and has the treatment capacity of not less than the peak flow generated from a one year, one hour storm in the subdrainage
4. Over 75,000 catch basin screens and inserts installed LA county wide to date
5. Initial approval for LAR was 2002 and for BC - 2004. Revised TMDL with progressive load reductions (after unsuccessful litigation) was issued in 2007. Full compliance deadline was 2015 for BC and 2016 for LAR

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WARNING!
NO SWIMMING
¡PELIGRO!
NO NADAR

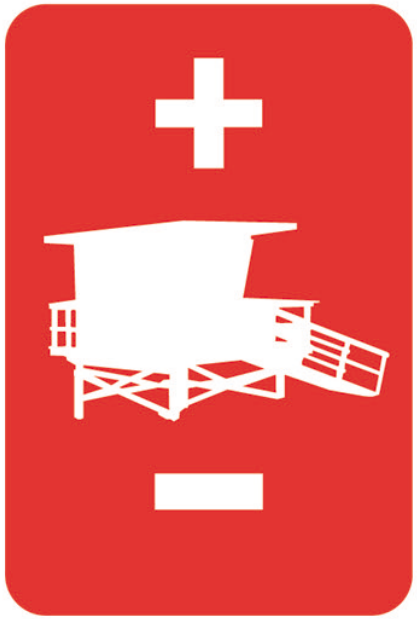
Beach Bacteria TMDL cont.

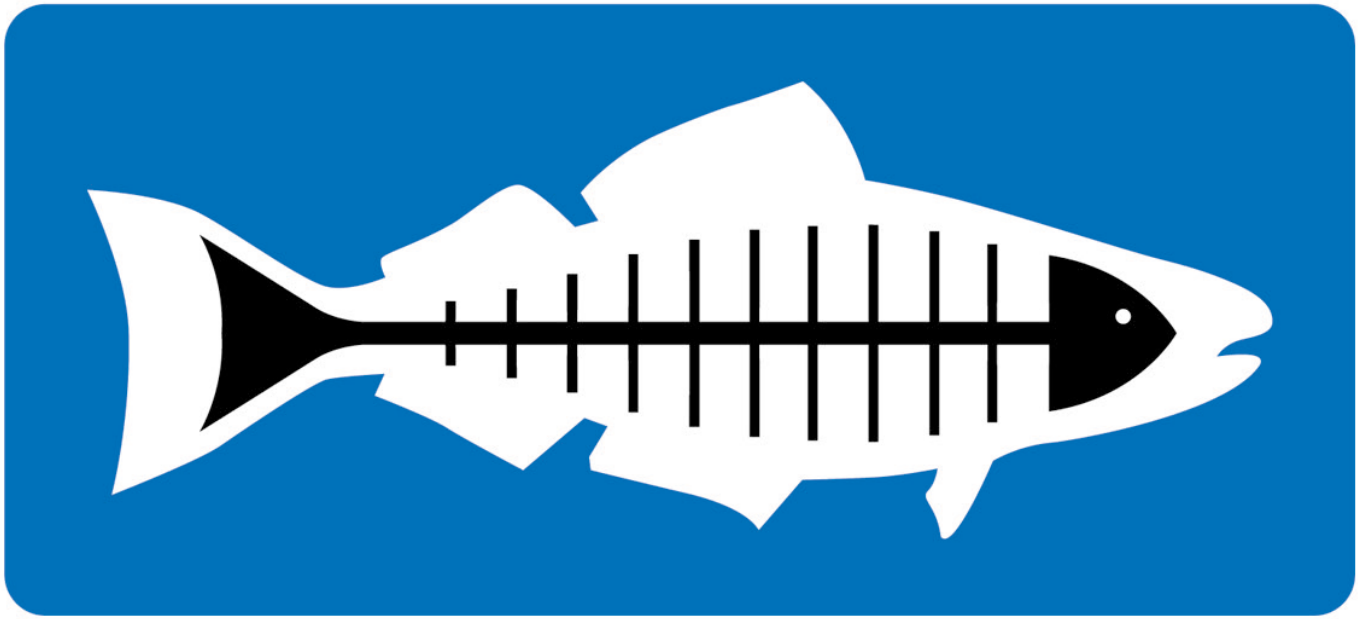
- Wet weather compliance deadlines – 10 years for conventional methods (subsurface storage and treatment similar to areas with combined sewer overflows).
- 18 years for an integrated approach – flood control, augmenting local water supply, open space.
- Addition of Marina Del Rey, LA Harbor and Ventura Harbor beach bacteria TMDLs. Now North San Diego County and Baby Beach in Dana Point, too.

Beach Bacteria TMDL

- SM Bay beach bacteria TMDL – dry and wet weather requirements
- From April 1st to October 31st, all SM Bay beaches must meet FIB standards 100% of the time
- Summer compliance deadline was July 15th, 2006.
- **State made standards enforceable by putting them in LA County stormwater permit**
- Dry weather year round compliance by July 2009 – 3 violations

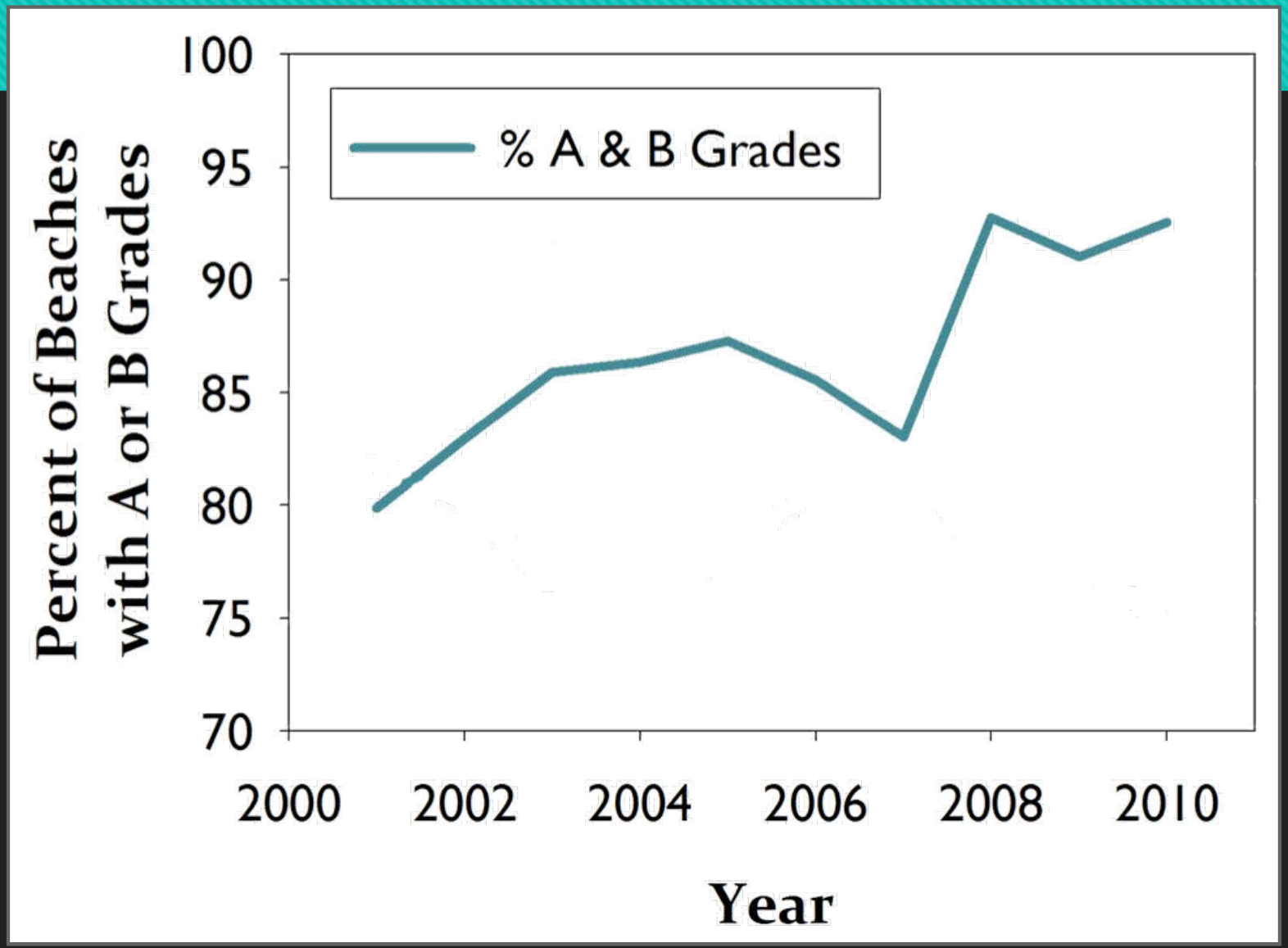
BEACH REPORT CARD





www.healthebay.org

TMDLs and projects led to further beach water quality improvements - summer



State Water Bond Measures
General obligation bonds (State pays them back through general fund).

- Propositions 13, 40, 50, 84 and 1
- Prop 13 – 2000 - 65% approval - $2 Billion
- Prop 40 – March 2002 – 57% approval - $2.6 Billion
- Prop 50 – November 2002 – 55% approval - $3.4 Billion
- Prop 84 – 2006 – 54% approval - $5.4 Billion
- Prop 1 -– 67% approval - $7.5 Billion
- Prop 68 – June, 2018 proposition – another $1.6B for water. TBD.
- 2018 voter initiative proposition – in progress. $8.9 billion. November ballot. TBD
- **Can only pay for capital costs. Not for Operations and maintenance or programs.**
- 2020 – Climate Resilience Bond in November? $6-$8M.

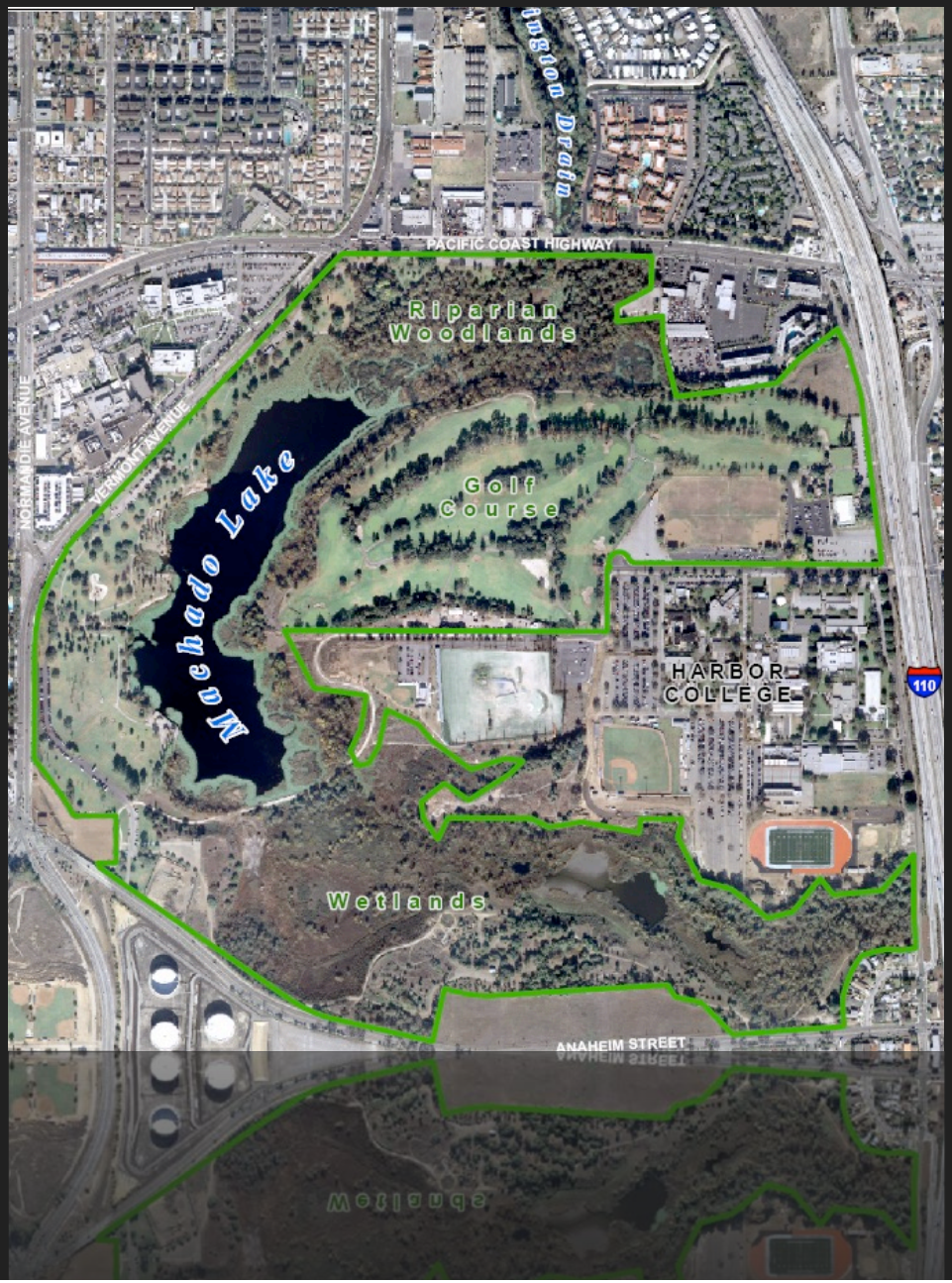
Proposition O

- $500 million bond measure for Los Angeles
- Passed with over 76% of the vote in 2004
- Primary focus – To enable L.A. to comply with the County stormwater permit and local TMDLs by reducing runoff pollution
- Secondary – multi-use benefits including water supply, flood control, recreation and habitat
- Bond measures only pay for capital costs

Green Streets and LID

Proposition O – Nature Based Solution project

Machado Lake Ecosystem Rehabilitation



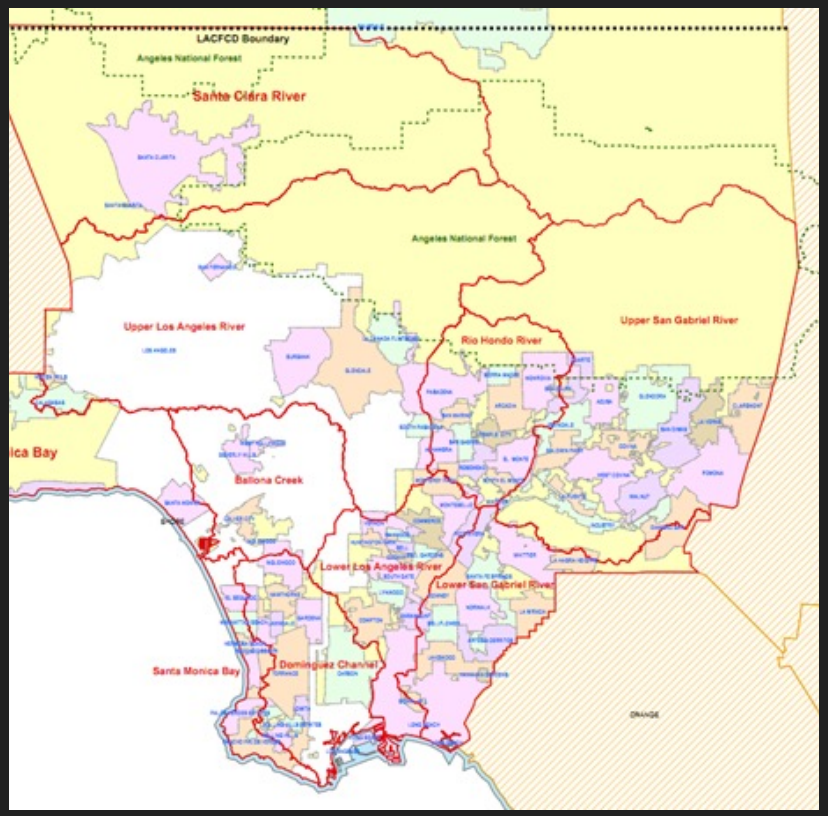
Vegetative Swale

Aeration System

CITY OF LOS ANGELES
SANITATION
DEPARTMENT OF
PUBLIC WORKS

Measure W

- Countywide measure - $83/household annually. $300 M/yr
- 9 watershed jurisdictions
- Approximately 40% for the cities, 50% for watershed groups. 10% for monitoring and administration.
- 218 challenges
- 2018 – LA County Measure W. Board of Supervisors voted 5-0 to pursue funding. Resiliency approach. **Passed with 69.5% of the vote!!!** Not just stormwater for water quality, but IWM. Safe, Clean Water Program. Goal of $300M a year in perpetuity. Parcel tax.



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